WHAT IS CLAIMED IS:

1. A method for filling a closed region, wherein the closed region is enclosed by a contour formed by a plurality of edge points, and each of the edge points has a previous edge point and a next edge point according to its order in the contour, the method comprising:

generating a path linked list comprising a plurality of nodes for recording the edge points on the contour and a plurality of intermediate points between the edge points on the contour;

generating a filling array linked list according to the path linked list for recording a plurality of filling line segments, wherein the two end points of each filling line segment are located on the contour while these filling line segments are located within the closed region; and

filling the closed region according to these filling line segments.

2. The filling method according to claim 1, wherein step of generating the path linked list comprises the steps of:

a1. determining a line flag of the edge point according to the relative position between the edge point and the previous edge point, wherein the line flag is of a first value if the line formed by the edge point and the previous edge is horizontal, of a second value if the line is vertival, and of a third value if the line is slanted;

a2. inserting the intermediate point into the path linked list if the intermediate point exists between the edge point and the previous edge point; and

a3. inserting the edge point to the end of the path linked list if the edge point is not the last edge point on the contour.

3. The filling method according to claim 2, wherein, in step a2 of the method, the intermediate point between the edge point and the previous edge point is not inserted if the line flag of the edge point is of the first value.

4. The filling method according to claim 2, wherein, in step a2, the intermediate points between the edge point and the previous edge point are inserted to the end of the path linked list in ascending order of vertical coordinates if the line flag of the edge point is of the second value and that the vertical coordinate of the edge point is greater than that of the previous edge point.

5. The filling method according to claim 2, wherein, in step a2, the intermediate points between the edge point and the previous edge point are inserted to the end of the path linked list in descending order of vertical coordinates if the line flag of the edge point is of a second value and that the vertical coordinate of the edge point is smaller than that of the previous edge point and that intermediate points exist between the edge point and the previous edge point.

6. The filling method according to claim 2, wherein, in step a2 of the method, the intermediate points between the edge point and the previous edge point are inserted to the end of the path linked list in ascending order of vertical coordinates if the line flag of the edge point is labeled 'slanting' and that the vertical coordinate of the edge point is greater than that of the previous edge point.

7. The filling method according to claim 2, wherein, in step a2, the intermediate points between the edge point and the previous edge point are inserted to the end of the path linked list in descending order of vertical coordinates if the line flag of the edge point is of a third value and that the vertical coordinate of the edge point is smaller than that of the previous edge point.

8. The filling method according to claim 7, wherein, in step a2, the intermediate points are obtained from a linear equation formed by the edge point and the previous edge point.

9. The filling method according to claim 2, wherein, in step a1, the line flag of the edge point is of the first value if the horizontal coordinate of the edge point is equal to that of the previous edge point.

10. The filling method according to claim 2, wherein, in step a1 of the method, the line flag of the edge point is of the second value if the vertical coordinate of the edge point is equal to that of the previous edge point.

11. The filling method according to claim 2, wherein, in step a1 of the method, the line flag of the edge point is of the third value if neither the horizontal coordinate nor the vertical coordinate of the edge point is equal to that of the previous edge point.

12. The filling method according to claim 1, wherein the filling array linked list has a plurality of line segment linked lists wherein each of these line segment linked lists is used for recording one of these filling line segments.

13. The filling method according to claim 12, wherein these filling line segments are horizontal.

14. The filling method according to claim 13, wherein, in the step of generating the filling array linked list, the intermediate point in the path linked list is recorded into its corresponding line segment linked list according to the vertical coordinate of the intermediate point.

15. The filling method according to claim 13, wherein, in the step of generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding line segment linked list twice according to the vertical coordinate of the edge point if the vertical coordinate of the edge point is greater than that of both the previous edge point and the next edge point.

16. The filling method according to claim 13, wherein, in the step of generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding line segment linked list twice according to the

vertical coordinate of the edge point if the vertical coordinate of the edge point is smaller than that of both the previous edge point and the next edge point.

17. The filling method according to claim 13, wherein the filling array linked list further comprises a horizontal linked list for recording at least one horizontal line segment on the contour.

18. The filling method according to claim 17, wherein, in the step of generating the filling array linked list, the edge point in the path linked list is recorded into the horizontal linked list of the filling array linked list if the edge point forms the horizontal line segment together with either the previous edge point or the next edge point.

19. The filling method according to claim 17, wherein, in the step of generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding horizontal linked list according to its vertical coordinate if the edge point forms the horizontal line segment together with the previous edge point.

20. The filling method according to claim 13, wherein, in the step of generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding horizontal linked list according to its vertical coordinate if the vertical coordinate of the edge point lies between the vertical coordinate of the previous edge point and the vertical coordinate of the next edge point.

21. The filling method according to claim 13, wherein, in the step of filling the closed region, the filling line segments recorded in the line segment linked lists are filled individually.

22. The filling method according to claim 17, wherein, in the step of filling the closed region, the filling line segments recorded in the line segment linked lists and the horizontal line segment in the horizontal linked list are filled individually.

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